DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10-06-2009 has been entered.

Election/Restrictions

2. **Claims 7-12** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 01-13-2009.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. **Claims 1, 2, 6, 13 and 15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Maruhashi et al (US 4393106) in view of Heiremans et al (US 4181239) in view of Pocock et al (US 4534995) in view of Kuckertz et al (US 6613394) in view of Tanaka et al (US 5071906) in view of Jorgens (US 5474610) as evidenced by Widenhouse et al (US2002/0169493).

Claim 1 is directed towards a method for manufacturing hollow bodies <u>made of PET</u> with gas barrier coating agent based upon PVA (poly(vinyl alcohol)) wherein said hollow bodies are:

a. <u>treated by flaming</u> to increase surface energy then;

b. electrostatically discharging the surface <u>by ionized air;</u>

c. <u>maintaining the warming of the hollow body from the flaming step;</u>

d. coating the surface <u>by swelling it with a coating agent;</u>

e. <u>allowing the coating agent to drip off;</u>

f. drying the coating

Maruhashi et al teach a process for manufacturing hollow bodies with gas barrier coatings (abstract and col 1, lines 6-18), including those made of PET (col 7, line 64 through col 8, line 25), wherein the hollow body is given a preliminary treatment to increase the substrate surface energy (increase wetting), such as a corona discharge treatment (col 10, lines 33-38). After the pretreatment, the hollow body is coated with a barrier layer material (col 10, lines 26-33). The coated material is then dried (col 11, lines 19-24). Maruhashi et al's goal is to produce a body with excellent gas barrier layer properties (col 1, lines 6-18) and teach the use of and effectiveness of many different materials (table 1), but they do not specifically teach using polyvinyl alcohol as the barrier coating material, using flaming as the energy increasing step, or discharging the body with ionized air.

However, Heiremans et al teach the use of polyvinyl alcohol as a gas barrier layer coating for hollow bodies. They teach that polyvinyl alcohol has an oxygen permeability of 6.24×10^{-17} $ml.cm/cm^2$ sec.cmHg (col 4, line 47), which is more than two orders of magnitude better oxygen resistance than any barrier material listed in Table 1 of Maruhashi et al.

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use a polyvinyl alcohol based coating as the barrier coating on the hollow bodies in order to improve the hollow bodies barrier property or in order to use thinner barrier films.

Additionally, Kuckertz et al teach that corona discharge methods have disadvantages, like the production of pin holes in the coatings (col 3, lines 19-21) and electrostatic charging. They teach that their method of exposing the surface to "an atmospheric plasma generated by an indirect plasmatron" avoids this disadvantage while still increasing surface energy (improving wettability) and increasing adhesion (col 4, lines 6-24). The surface to be treated is exposed to hot plasma with process gas/aerosol, which is a flaming process (col 7, lines 15-26).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use a flaming process instead of a corona discharge method in order to avoid electrostatic charging and pin holes in the coatings while still increasing the surface energy and improving adhesion of the coating deposited afterwards.

Furthermore, Pocock et al teach a method for treating hollow bodies to improve their barrier properties. In that method they teach that positively charged containers will collect dust from the air, which results in imperfections in the coating. They teach that conditioning the container with ionized air (electrostatically discharging it) before depositing the barrier coating will give the container a slightly negative charge and avoid this problem (col 2, lines 45-56).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to electrostatically discharge the container with ionized air before applying the barrier coating in order to reduce imperfections in the coating.

Regarding the limitation that the heat of the flaming step be maintained, Kuckertz et al teaches that the flaming (first pretreatment) process heats up the substrate, so the process should be controlled so that the substrate does not heat up so much that it reaches its melting temperature (col 1, line 67 through col 2, line 12): the substrate will be at an elevated temperature from this first preliminary treatment step. It will take some finite period of time after the treatment before this heat energy can be conducted, convected or radiated away from the substrate. Thus for this period of time, the warming of the substrate from the first preliminary treatment step is maintained.

Regarding the swelling limitation. Maruhashi et al teaches that an appropriate organic solvent should be used for the film forming resin used (col 10, lines 48-60), but it does not specifically teach what organic solvent should be used for PVA.

However, Tanaka et al is directed towards forming films of PVA (col 4, lines 9-11) and it teaches that an especially preferred organic solvent for PVA is dimethyl sulfoxide (col 3, lines 45-55).

Furthermore, as evidence by Widenhouse et al, when they are in contact, dimethyl sulfoxide swells PET (table 1).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use dimethyl sulfoxide as the organic solvent for PVA, which will result in the PET swelling, it is obvious to use this solvent since it was known to be an especially preferred organic solvent for PVA and would produce predictable results.

Regarding the limitation that the coating agent drip off, Maruhashi et al teach that coating can be performed by dipping the hollow body in the coating agent (col 10, lines 26-29), but it does not specifically teach dripping the coating agent off of the hollow body.

However, Jorgens is also directed towards dip coating of hollow bodies (abstract), it further teaches that when the hollow bodies are removed from the dip bath, excess coating agent is allowed to drip off of the hollow body, in order to remove the excess coating agent, the hollow body can then be dried (col 2, lines 20-25).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to allow coating agent to drip off of the hollow body after the dip coating process in order to remove the excess coating agent before drying the film **(claim 1)**.

4. Regarding **claim 2**, Kuckertz et al teaches that when the treated surface is polyethylene teraphthalate (PET), they used a flaming process to increase the surface energy to 62-64mN/m (table 2).

   Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to increase the PET surface energy to 62-64mN/m since that is a surface energy taught to be suitable when trying to increase the wettability of the PET.

5. Regarding **claims 2 and 13**, as discussed previously, Maruhashi et al teaches the desirability of increasing the substrate surface energy (increase wetting) by using a

plasma treatment (col 10, lines 33-38), as does Kuckertz, which teaches that increasing the surface energy (surface tension) of the substrate by the plasma treatment increases the wettability of that surface (col 6, lines 1-15). In other words, the surface energy is a result effective variable for determining the wettability of the substrate, with higher surface energies come increased wettability.

It would have been obvious to one of ordinary skill in the art at the time of invention to choose the instantly claimed ranges of “greater than 70mN/m” through process optimization, since it has been held that when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

6. Regarding **claims 6 and 15**, Maruhashi et al teach that the appropriate drying process conditions are changed depending upon the thickness of the coating layer, and that drying at a temperature range between 40^{o}C and 160^{o}C is usually sufficient (col 11, lines 19-34). This overlaps with applicants claimed temperature ranges. In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Heiremans et al teach that polyvinyl alcohol is sensitive to humidity with a decrease in its barrier properties towards oxygen with increasing absorption of humidity (col 5, lines 9-15).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to dry the polyvinyl alcohol coating using an environment with no

moisture present in order to avoid degrading the barrier layer properties of the coating. This of course falls within the claimed range of less than 3 g/m^3 of water.

7. **Claims 4 and 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Maruhashi et al in view of Heiremans et al in view of Pocock et al in view of Kuckertz et al in view of Tanaka et al in view of Jorgens as applied to claim 1 above, and further in view of Hostettler et al (US 6017577) as evidenced by Rao et al (Journal of the American Oil Chemists' Society, vol 34, number 12 (1957). p 610-611).

Claim 4 further requires an additional preliminary treatment of the surface with a fat dissolving agent before the surface energy increasing treatment. Maruhashi et al in view of Heiremans et al in view of Pocock et al in view of Kuckertz et al in view of Tanaka et al in view of Jorgens teaches that plasma treatments on those substrates, like corona discharge or flaming to increase their surface energy, but they do not teach a treatment before the plasma treatment.

However, Hostettler et al teaches that “it is often advantageous to pretreat the polymeric substrate surface before plasma treatments with polar or nonpolar organic solvents… in order to remove any surface impurities…”(col 9, lines 62-66). These surface impurities can interfere with the plasma treatment (col 10, lines18-19). Hostettler et al teach using ethyl alcohol (ethanol) as a suitable solvent **(claim 14)**, which, according to Rao et al is also a fat dissolving agent (page 610).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to treat the surface of the hollow body with ethyl alcohol before the

plasma treatment in order to remove impurities that could interfere with the efficacy of the plasma treatment **(claim 4)**.

8. **Claims 16 and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Maruhashi et al in view of Heiremans et al in view of Pocock et al as applied to claim 1 above, and further in view of Hostettler et al (US 6017577) as evidenced by Rao et al (Journal of the American Oil Chemists' Society, vol 34, number 12 (1957). p 610-611).

Claim 16 is directed towards a method for manufacturing hollow bodies with gas barrier coating agent based upon polyvinyl alcohol wherein said hollow bodies are:

a. Treated with a fat dissolving agent, then
b. pretreated to increase surface energy, then
c. electrostatically discharging the surface,
d. coating the surface, and then
e. drying the surface

Maruhashi et al teach a process for manufacturing hollow bodies with gas barrier coatings (abstract and col 1, lines 6-18) wherein the hollow body is given a preliminary treatment to increase the substrate surface energy (increase wetting), such as a corona discharge treatment (col 10, lines 33-38). After the pretreatment, the hollow body is coated with a barrier layer material (col 10, lines 26-33). The coated material is then dried (col 11, lines 19-24). Maruhashi et al's goal is to produce a body with excellent gas barrier layer properties (col 1, lines

6-18) and teach the use of and effectiveness of many different materials (table 1), but they do not specifically teach using polyvinyl alcohol as the barrier coating material.

However, Heiremans et al teach the use of polyvinyl alcohol as a gas barrier layer coating for hollow bodies. They teach that polyvinyl alcohol has an oxygen permeability of 6.24 X 10^{-17} ml.cm/cm^2 sec.cmHg (col 4, line 47), which is more than two orders of magnitude better oxygen resistance than any barrier material listed in Table 1 of Maruhashi et al.

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use a polyvinyl alcohol based coating as the barrier coating on the hollow bodies in order to improve the hollow bodies barrier property or in order to use thinner barrier films.

Furthermore, Pocock et al teach a method for treating hollow bodies to improve their barrier properties. In that method they teach that positively charged containers will collect dust from the air, which results in imperfections in the coating. They teach that conditioning the container with ionized air (electrostatically discharging it) before depositing the barrier coating will give the container a slightly negative charge and avoid this problem (col 2, lines 45-56).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to electrostatically discharge the container before applying the barrier coating in order to reduce imperfections in the coating.

Regarding the preliminary treatment of the surface with a fat dissolving agent before the surface energy increasing treatment. Maruhashi et al in view of Heiremans et al in view of Pocock et al teach the production of polymeric hollow bodies (for examples, the abstract of Maruhashi). As stated above, they teach plasma treatments on those substrates, like corona discharge to increase their surface energy, but they do not teach a treatment before the plasma treatment.

However, Hostettler et al teach that "it is often advantageous to pretreat the polymeric substrate surface before plasma treatments with polar or nonpolar organic solvents… in order to remove any surface impurities…"(col 9, lines 62-66). These surface impurities can interfere with the plasma treatment (col 10, lines18-19). Hostettler et al teach using ethyl alcohol (ethanol) as a suitable solvent **(claim 17)**, which, according to Rao et al is also a fat dissolving agent (page 610).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to treat the surface of the hollow body with ethyl alcohol before the plasma treatment in order to remove impurities that could interfere with the efficacy of the plasma treatment **(claim 16)**.

Response to Arguments

9. Applicant's arguments filed 10-06-2009 have been fully considered but they are not persuasive in view of the new rejection necessitated by amendment.

10. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are

based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

11. In response to applicant's argument that a conducting treatment is somehow contrary to a step of electrostatically discharging, the examiner disagrees. It is perfectly consistent with the process to apply additional coatings to the substrate, including conductive ones.
12. In response to applicant's argument that no references of record teach using a fat dissolving agent, the examiner notes that that limitation is found in Hostettler et al, which was previously applied in claim 4 for the limitation of a fat dissolving agent.

Conclusion

No current claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL G. HORNING whose telephone number is (571) 270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael B. Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. G. H./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792